WHAT IS CLAIMED IS:

1. A method for producing a highly purified single-wall carbon nanotube (SWNT) material, comprising:

refluxing a crude SWNT material in a solution to form a refluxed SWNT material having at least a partial carbon coating thereon; and

oxidizing said refluxed SWNT material to remove at least a portion of said carbon coating formed thereon.

2. The method of claim 1, further comprising removing at least a portion of metal incorporated in said crude SWNT material.

3. The method of claim 1, wherein said refluxing of said crude SWNT material is conducted in a dilute nitric acid solution.

4. The method of claim 1, further comprising separating said refluxed SWNT material from said solution before oxidizing said refluxed SWNT material.

5. The method of claim 4, wherein separating comprises filtering said refluxed SWNT material to produce a filtered SWNT material.

6. The method of claim 5, further comprising suspending said filtered SWNT material in another solution and evaporating said another solution to form a thin film of said refluxed SWNT material.

7. The method of claim 1, further comprising synthesizing said crude SWNT material.

8. The method of claim 7, wherein synthesizing said crude SWNT material is by long-laser pulsing of a graphite target.

9. The method of claim 8, further comprising maintaining the laser in a vaporization regime during synthesis.

10. The method of claim 7, further comprising reducing the occurrence of graphite and graphite-encapsulated particles during synthesis of said crude SWNT material.

11. A highly purified single-wall carbon nanotube (SWNT) produced according to the method of claim 1.

12. The highly purified single-wall carbon nanotube (SWNT) of claim 11, comprising less than about 0.5 wt% of metal as determined by thermal gravimetric analysis (TGA).

13. The highly purified single-wall carbon nanotube (SWNT) of claim 11, characterized as at least 98 wt% pure SWNT material.

14. A non-destructive method for producing highly purified single-wall carbon nanotubes (SWNTs), comprising:

generating a crude SWNT material having at least a carbon nanotube fraction and a non-nanotube carbon fraction;

refluxing said crude SWNT material in an acid solution to produce a refluxed SWNT material, wherein at least a portion of said non-nanotube carbon fraction is redistributed as a uniform carbon coating on the carbon nanotube fraction; and

oxidizing said refluxed SWNT material to remove said uniform carbon coating formed thereon.

15. The method of claim 14, further comprising removing substantially all metal from said

crude SWNT material during refluxing thereof.

16. The method of claim 14, further comprising forming a functional group on said uniform carbon coating to enhance removal of said uniform carbon coating.

17. The method of claim 14, further comprising decreasing the domain size of said non-nanotube carbon fraction to enhance removal of said uniform carbon coating.

18. The method of claim 14, further comprising annealing said oxidized SWNT material to remove substantially all metal remaining thereon.

19. The method of claim 14, wherein oxidizing said refluxed SWNT material is in a gas-phase oxidant.

20. The method of claim 14, wherein oxidizing said refluxed SWNT material is at about 550°C.

21. The method of claim 14, wherein oxidizing said refluxed SWNT material is for about 30 minutes.

22. The method of claim 14, further comprising drying said refluxed SWNT material.

23. The method of claim 14, further comprising separating said refluxed SWNT material from said acid solution.

24. The method of claim 14, wherein generating said crude SWNT material is by long-laser pulsing a graphite target.

25. The method of claim 24, further comprising operating a laser in free-running mode to

produce gated laser light ranging in duration from 300 to 500 ns.

26. The method of claim 24, wherein said graphite target is made of pressed-powdered graphite having metal catalysts therein.

27. The method of claim 14, further comprising maintaining a laser in a vaporization regime during synthesis.

28. The method of claim 14, further comprising reducing the occurrence of graphite and graphite-encapsulated particles during synthesis of said crude SWNT material.

29. The method of claim 14, wherein refluxing is in 3M HNO_3 for 16 hours at 120°C.

30. The method of claim 14, wherein generating said crude SWNT material is by arc discharge.

31. The method of claim 14, wherein generating said crude SWNT material is by chemical vapor deposition.